



HYDROGEN GENERATOR

At left is a spinoff system for producing hydrogen on site that went into operation late in 1982 at the Sewaren (New Jersey) Generating Station of Public Service Electric and Gas Company (PSE&G). Called the ES-1000 Hydrogen Generator, the system was developed by General Electric Company's Aircraft Equipment Division, Wilmington, Massachusetts. The hydrogen is used as a coolant for the station's large generators; on-site production eliminates the need for continuous resupply of hydrogen. At lower left, a technician is filling tanks with hydrogen produced by the ES-1000; formerly, the tanks had to be filled once a week from supplies delivered by tube-trailer.

The unit generates high-purity hydrogen by electrolysis, the process of breaking down a chemical compound by passing an electric current through it. In this instance, the compound is distilled water, which is separated into hydrogen and oxygen. Water electrolysis has been tried in the past for this type of application, but the ES-1000 is unique in that its electrolyte—the electricity-conducting medium—is a solid plastic membrane; in other electrolysis systems, electrolytes are usually liquid caustic or acid solutions. The GE-developed Solid Polymer Electrolyte, a membrane about one hundredth of an inch thick, serves as both electrolyte and separator of the hydrogen and oxygen produced. Since the distilled water being broken down is the only liquid in the system, there are no hazardous acids or caustic substances to be handled, monitored or cleaned up. The ES-1000 has an electronic control system that allows unattended operation and automatically shuts the unit down if it is not operating properly; among other advantages are high efficiency for lower operating cost and compact design that reduces installation space.

GE's solid polymer electrolyte technology was originally developed for use in the fuel cell power system of NASA's Gemini manned spacecraft, flown in 1965-66. Under contract to Johnson Space Center, GE has worked for several years to refine the technology and develop a unit for generating oxygen as part of the life support system of a manned space station; the oxygen generator is still being tested. Since 1979, GE has been working with the Electric Power Research Institute and PSE&G in developing the electrolysis system for the utility generator cooling application. The PSE&G unit was the first to go into service; two additional systems have been delivered to Iraq for installation at a generating station in Baghdad.

